



BITS College

School of Systems and Technology

*Curriculum for
Graduate program in*

*Information Technology
Management*

**Revised
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Addis Ababa, Ethiopia**

Promoting excellence in learning and teaching

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1. Introduction

1.1 BITS College

BITS College is a private higher learning institution with a vision of promoting excellence in the production, growth and dissemination of advanced scientific knowledge through teaching and research. The College is conceived, established and run by caring and committed educators and innovators who seek to improve the quality of higher education in the country through the introduction of innovative and enlightened education programs that help students realize their potential. It aims at realizing this by engaging a management team experienced in education and business, a dedicated team of faculty and staff, well-designed academic programs, world class educational facilities and cutting-edge technologies. The senior management team comes with over 30 years' combined experience in teaching at tertiary level (at Addis Ababa University (AAU)), holding senior management positions at AAU (education management), unique and proven track record in corporate management in technology (IT service) industries.

Among the founders of the College is a focused and well-reputed system development and training company, with proven track record in business process management and enterprise software development and support. Founded in 2012, the IT Company mainly involves in the design and development of innovative and high-quality web-based business applications for the logistics, construction, and health sectors. In fact, BITS had its genesis in this IT Company.

BITS plans to engage in mutually rewarding collaborations and strategic partnerships with national, international, public, and private higher learning and research institutions so as to grow and become a full-fledged university that offers undergraduate and graduate degree programs in business and technology related fields.

The executive officer of the College is the President assisted by the Vice President for Academic Affairs and Research (VPAAR) and the Vice President for Business and Administration (VPBA).

The highest decision-making body of the College is the Academic Board (AB). However, most academic and administration activities are carried out by the Executive Management (EM). The College Academic Affairs and Research Council (CAARC) is a standing committee accountable to the EM. The CAARC, working under the chairmanship of the Vice President

for Academic Affairs and Research (VPAAR), deliberates and decides on all academic matters of the College on behalf of the EM. At School level, the Head, program coordinators and staff members deliberate on the day-to-day academic matters in their respective academic committees.

Currently, the School of Systems and Technology is established under the College to offer four academic programs, namely:

- Master of Science Degree in Information Technology Management
- Master of Science Degree in Enterprise Systems Engineering
- Bachelor of Science Degree in IT and Systems
- Bachelor of Science Degree in Software Engineering

The main purpose of this document is to present the required narratives to establish the **Graduate Program in Information Technology Management**. Accordingly, the document is organized as follows. The remaining part of this section presents the rationale for the graduate program in Information Technology Management. The second section of the document presents the curriculum. The third section details the resource requirements of the program. Section four presents the course offering schedule and the last section briefly outlines the mechanisms that would be adopted for quality assurance.

1.2 Rationale

ICT has taken the centre stage in almost every aspect of human endeavour. It helps improve the efficiency and effectiveness of services offered to customers, and enhance business processes, managerial decision making, and workgroup collaborations, which strengthens competitive positions in rapidly changing and emerging economies. These needs have created demands for skilled workforce in various IT professions. It is also realized that software and technical development have been remarkably increasing in the last few decades. Particularly software applications have profoundly transformed markets, industries and the society in general. Not only is the dependence on software increasing but the character of software production itself is changing and with it the demands of the industry. Furthermore, with the huge investment in business industries such as Banking and Telecom, there is a greater demand for an ICT workforce of world standard. Specializations in various technical knowledge such as service management, governance, IT Audit and cyber security are in demand. With the

increasing competition and customer demand, business organizations will be required to allocate greater resources into ICT governance and security infrastructure. The growing impact of ICT innovation on financial services will likely create new skill requirements for ICT professionals looking to work in the rapidly evolving intersection between technology and finance. As such, both the software and business industries expect students to be educated in courses and projects that are professionally relevant and that prepare them well for the work place.

On the other hand, everyone agrees that the country's future lies in educating its people to the highest possible standards. In order for the country to reach its economic and social goals, a thriving and successful higher education system is essential. The increasing enrolment and graduates in recent years also indicate the commitment in this country to further expand and modernize tertiary level education - to provide greater opportunities for all citizens. We also observe in the job market, that a college degree is becoming the preferred currency of the job application processes more and more - those without degrees are being given less and less preference by employers.

Despite such encouraging developments of increasing the number of college degree holders, much serious concerns are being expressed with regard to the quality of graduates.

- There is widespread dissatisfaction among both graduates and their employers on the performances of the graduates in the work area.
- The enrolled and graduates feel not necessarily better educated in employable skills, problem solving skills, critical thinking skills, etc.
- Employers feel that current graduates are deficient in thinking and problem-solving skills and hence inadequate for the demands of the workplace.
- In the case of IT graduates, for instance, graduates lack the ability to link technology and information systems with business processes and strategic objectives of organizations.
- There is a growing awareness among employers that graduates entering the workforce with such deficiencies would have a great repercussion on the ability to be competitive in a global marketplace.

Taking cognizance of this, as of recent, the need to introduce initiatives to improve/increase the quality of education is being advocated widely. Deliberations are underway at various forums on the whys and wherefores of the deficiencies. Among the issues under consideration are: revisiting college entrance preparations and exams; exploring ways and means of considering employable skills in the design and delivery of curricula; redesigning the national education roadmap, et cetera.

To this end, in the wake of the numerous challenges facing education in the country, and motivated by some of the national initiatives in this connection, BITS College is established to make its share of contribution to the on-going efforts of quality improvement. We seize this chance to address the challenge of providing education that meets high quality standards and whose contents are aligned to the needs of the country's economy and society.

The proposed graduate programs in Information Technology Management is designed to prepare personnel well equipped to manage IT Services in large business and financial companies.

2. Master of Science in Information Technology Management (M.Sc. ITM)

2.1 Program Objective

M. Sc. in Information Technology Management is a novel program allowing students to acquire skills that are crucial for career advancement in today's rapidly growing knowledge-economy. Graduates in Information Technology Management will have a competitive advantage over colleagues who only have a background in Programming or Computer Science. In the course of the study, essential project management skills are acquired through research based lectures and workshops. These include project control and organisational planning, allowing graduates to improve their ability to lead and make strategic decisions.

2.2 Graduate Profiles

The graduates of the program will:

- Demonstrate high level of intellectual competency in IT Service Management and Governance;

- Demonstrate good problem-solving ability and be able to apply their knowledge to real-world IT Service management tasks;
- Efficiently manage projects such as outsourcing management, contingency planning, strategic alignment and change management;
- Be able to give high quality verbal presentations on IT Service Management and Governance;
- Have a good basis for performing innovative, novel and applied research in IT Service Management and IT Governance;
- Have the knowledge and skills to act as lecturers in higher education institutions;
- Have a professional and ethical attitude to their work, and possess good leadership qualities.

2.3 Admission Requirements

The admission requirements for graduate program in Information Technology Management are as follows:

- A first degree in IT related field of study such as information technology, computer science, Information Science/Systems, Software Engineering and Computer Engineering, from an accredited institution.

OR

- A first degree in any discipline with a minor in computer science and related fields like Information Science/Systems, Software Engineering and Computer Engineering, from an accredited institution.

AND

- A passing mark in the College's entrance exam

2.4 Graduation Requirements

2.4.1 Course Offering Sketch

Experiences from similar programs indicate that a large number of technical and other supporting courses should not be the first subjects of study. Accordingly, core courses suggested for offering during the first semester of the first year are considered essential/fundamental in terms of preparing the students for the field of study.

In the second semester of the first year, students will be required to take more specific courses that consist of a set of selected topics and practicum designed to help students to further deepen their knowledge in Information Technology Management.

In the first semester of the second year, students will be required to take two more core courses and select one elective course. The elective courses are designed to prepare students for an independent but guided research project in specialized fields of IT management. The last semester of the program will be fully devoted to the research project.

2.4.2 Course Requirements

The program features 30 credit hours (70 ECTS) of compulsory courses, 3 credit hours (7 ECTS) of elective courses and 6 credit hours (14 ECTS) of thesis. Therefore, the minimum number of credit hours for graduation is 39 (91 ECTS). Lists of compulsory and elective courses are given below.

(i) Compulsory Courses (30 Credit Hrs. – 70 ECTS):

Students must take and pass all of the following courses to graduate from the program:

Code	Course Title	Credit Hrs.	ECTS
IT615	IT and Business Strategy Alignment	3	7
IT625	Service Innovation and Design	3	7
IT631	Research Methods in IT and Systems	3	7
ES621	Systems Theory and Systems Thinking	3	7
IT618	IT Service Management	3	7
IT644	Enterprise Cloud Computing	3	7
IT646	IT Security Management	3	7
IT656	IT Project Management	3	7
IT711	IT Systems Acquisition and Management	3	7
IT715	IT Governance and Audit	3	7
		30	70

(ii) Elective Courses (3 Credit Hrs. – 7 ECTS):

In order to graduate from the program, students must take and pass a minimum of 3 credit hours of courses from the following list.

Code	Course Title	Credit Hrs.	ECTS
IT727	Special Topics in Information Technology Management	3	7
IT732	Cyber Security	3	7
IT741	Data Centre Design and Management	3	7

(iii) Thesis / Project (6 Credit Hrs. – 14 ECTS)

All students will be required to conduct research or Project and produce a report as partial fulfilment of the requirement for M.Sc. program in Information Technology Management.

2.4.2 Cumulative Grade Point Requirements

To graduate from the program, students must pass every compulsory course, and at least 3 credit hours (7 ECTS) of elective courses with a cumulative grade point average of at least 3.0. A pass grade for a course is considered to be A, B+, B, C+ or C.

2.5 Duration of Study

The duration for the completion of the graduate program shall range from a minimum of one and half years to a maximum of two years. The maximum allowable period to complete the program is four years.

2.6 Degree Award and Nomenclature

The Degree Awarded upon successful completion of the requirements of the program is

“Master of Science in Information Technology Management”

Degree Nomenclature

English:

“Master of Science in Information Technology Management”

Amharic:

“የማስተራት ዲግሪ በ “ኢንፎርሜሽን ቴክኖሎጂ ማኔጅመንት”

2.7 Description of Core Courses

2.7.1 IT615 IT and Business Strategy Alignment

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	Information Technology has become an integral part of successful business strategy. The course covers: the evolving role of IT in organizations as a driver of competitive advantage and creator of value; the relationships between IT resources, organizational capabilities and organizational performance; the translation of business vision and strategies into IT strategy and operating plans; the association of IT investment/budget with business goals and operations; developing aligned IT resources and capabilities; the role of enterprise architecture in business and IT alignment; assessing IT components or functional areas for strategic differentiation and effectiveness; IT implementation models and perspectives.	
Learning Outcome:	<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • explain the role of information technology in shaping and delivering business goals and strategies; • articulate the concepts and components of business architecture; • articulate enterprise IT implementation models and perspectives; and • effectively participate in a team effort to translate business vision and strategies into IT strategy and operating plans 	
Course Content		
Unit	Topic	Week
1	Evolving role of IT in organizations <ul style="list-style-type: none"> • IT and organizational capabilities • Business value from IT 	1
2	Understanding business strategies <ul style="list-style-type: none"> • Business scope • Business competence • Business performance • Business governance 	2-3
3	IT strategy and operating plans <ul style="list-style-type: none"> • IT scope • IT competence • IT governance 	4-5
4	Business-IT strategy <ul style="list-style-type: none"> • Basic concepts • Alignment gap • Managing the alignment 	6-7
5	Strategic alignment <ul style="list-style-type: none"> • Strategic fit • Functional integration 	8-9
6	Business-IT strategic alignment perspectives <ul style="list-style-type: none"> • Key concepts • Business strategy as the driver • IT strategy as the enabler • Alignment gap 	10-11
7	Alignment methods <ul style="list-style-type: none"> • Role of systems thinking in business-IT alignment 	12-13

	<ul style="list-style-type: none"> • Role of enterprise architecture in business-IT alignment • Role of governance in business-IT alignment 	
8	<p>Measuring Business/IT Alignment</p> <ul style="list-style-type: none"> • The matching & moderation approach • The profile deviation approach • The scoring approaches • The Maturity Model Approach • Business/IT Alignment Benchmark 	14
Recommended References:	<ol style="list-style-type: none"> 1. The Practice of Enterprise Architecture: A Modern Approach to Business and IT Alignment, 2018, by Svyatoslav Kotusev 2. The New IT: How Technology Leaders are Enabling Business Strategy in the Digital Age, 2015, by Jill Dyche 3. Enterprise Governance of Information Technology: Achieving Strategic Alignment and Value, 2009, by Wim Van Grembergen and Steven De Haes 4. IT Governance: How to Reduce Costs and Improve Data Quality through the Implementation of IT Governance, 2017, by Helmut Schindlwick <p>There will also be supplemental readings beyond the References, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Teaching Strategy:	Lectures, Book review, Case illustration, Team case project discussions	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.2 IT625 Service Innovation and Design

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	The course explores foundational concepts of service operation, its value proposition, functions and processes within service lifecycle, service management models, service improvement, standard and best-practice frameworks. The course explains the importance of service innovation for sustainable business success through improving customer solutions and business performance. Topics covered include, approaches and processes to service innovation, service design thinking and tools, drivers, dimensions and pitfalls of service innovation, ways of motivating employees and challenging different perspectives, The course also covers state-of-the-art literature as well as a practical project challenge for hands-on experience. Students will get the opportunity to work in teams and create a service innovation by applying a range of tools taught in the class.	
Learning Outcome	Upon successful completion of this course, students will be able to: <ul style="list-style-type: none"> • gain an appreciation for the growing importance of services, service design and service management. • identify, describe, and explain service models. • attain knowledge of relevant service management concepts and service design tools. • apply service management concepts and service design tools to a service process. • analyse, criticize and compare service management and service design tools • evaluate, appraise, measure and judge a service failure and service excellence case 	
Course Content		
Unit	Topic	Week
1	Understanding Services <ul style="list-style-type: none"> • Service Definitions • Nature of service organization • Distinctive Characteristics of Service Operations • service operation and its value proposition 	1
2	Service Improvement and Innovation <ul style="list-style-type: none"> • Service improvement concepts • Servitization and Deservitization • Approaches and processes to service innovation • Theoretical approaches to service innovation • Systemic service innovation • Customer value and experience 	2-3
3	Dimensional model of service innovation <ul style="list-style-type: none"> • Service concept • Client interface • Delivery system/organization • Technological option Patterns of service innovation <ul style="list-style-type: none"> • Supplier-dominated innovation • Client-led innovation 	4
4	Service Strategy <ul style="list-style-type: none"> • Understanding the competitive environment of services 	5

	<ul style="list-style-type: none"> • Strategic analysis • Service logic based strategic management • Sustainability in services 	
5	<p>New Service Development</p> <ul style="list-style-type: none"> • Key concepts and principles of design thinking • Service blueprinting • The importance of service design • Approaches to service system design <ul style="list-style-type: none"> ○ Production-line approach ○ Customer as co-producer ○ Customer contact approach ○ Information empowerment • Facility Design 	6-7
6	<p>Service Quality</p> <ul style="list-style-type: none"> • Dimensions of service quality • Measuring service quality • Achieving service quality • Approaches to service recovery 	8
7	<p>Managing Service Operations</p> <ul style="list-style-type: none"> • Service management models • Outsourcing services • Social media in services • Managing capacity and demand • Performance measurement 	9-10
8	<p>Designing the Customer Feedback System</p> <ul style="list-style-type: none"> • Questioning and analysis • Active/Passive feedback solicitation • In-Process and Ex-Post feedback solicitation • Feedback channelling • Futures thinking/trends in service innovation 	11-12
Book review ,Case illustration ,Team case project		13-14
Recommended References:	<ol style="list-style-type: none"> 1. Essentials of Service Design and Innovation - 4th Edition: Developing high-value service businesses with PCN Analysis, 2015 by Scott E. Sampson 2. Design a Better Business: New Tools, Skills, and Mindset for Strategy and Innovation, 2016, by Patrick Van Der Pijl and Justin Lokitz 3. Innovation by Design: How Any Organization Can Leverage Design Thinking to Produce Change, Drive New Ideas, and Deliver Meaningful Solutions, 2017, by Thomas Lockwood and Edgar Papke 4. Strategic Design Thinking: Innovation in Products, Services, Experiences and Beyond, 2015, by Natalie W. Nixon and Joseph H. II 	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.3 ES621 Systems Theory and Systems Thinking

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	The course covers systems theory; wholeness, interrelationships and dynamics in systems thinking; systems thinking vs. process thinking. Taking the systems view of organizations and systems thinking as a management discipline, the course helps students in understanding and clarifying organizational situation with systems thinking, as well as exploring foundational concepts of organizational learning and systems approach to identify leverage points for systemic interventions.	
Learning Outcome:	<p>On successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • Gain an understanding of the language and concepts of systems, systems thinking, and complexity, and their implications for the workplace • Gain an understanding of specific types of systems, that may be at play within complex problems • Practice using a comprehensive Systems Thinking Guide to apply in understanding of systems thinking to a challenging situation and opportunity • Develop an action plan to deal with the organizational problem and opportunity • Gain an understanding of how to use systems thinking in a variety of situations 	
Course Content		
Unit	Topic	Week
1	Overview <ul style="list-style-type: none"> • Systems thinking overview • Systems thinking and complexity • Systems thinking and soft\hard systems • Systems thinking versus conventional thinking • Systems thinking as a management discipline • Synthesis & Analysis 	1-2
2	General Concepts <ul style="list-style-type: none"> • Objects & Events • Deeper structure, behaviour and discipline • Understanding multiple perspectives • System boundary & environment • Synergic relations • Emergence • System hierarchy & abstraction • System dynamics 	3-5
3	Model of a System <ul style="list-style-type: none"> • Sets & systems • System functions • System efficiency 	6
4	Systems Approaches and Methods <ul style="list-style-type: none"> • The hard\soft traditions • Experience-action cycle • Methods and tools • Abstraction 	7-9

	<ul style="list-style-type: none"> • Modelling and simulation diagrams • Soft systems methodology 	
5	<p>Applying Systems Thinking</p> <ul style="list-style-type: none"> • For understanding organizational situation • For change management • For strategic planning • For evaluation • For social change 	10-11
Book review, Case illustration, Team case project		12-14
Recommended References:	<ol style="list-style-type: none"> 1. Systems Thinking For Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results, 2015, by <u>David Peter Stroh</u> 2. Gharakhani Bahar (2014) System and Systems Thinking: (Whole Review) 3. Jimmy Brown (2012) Systems Thinking Strategy: The New Way to Understand Your Business and Drive Performance 4. David Kerr (2012) An Introductory Guide to Systems Thinking 5. <u>Jamshid Gharajedaghi</u> (2011). Systems Thinking, Third Edition: Managing Chaos and Complexity: A Platform for Designing Business Architecture <p>There will also be supplemental readings beyond the References such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.4 IT631 Research Methods in IT and Systems

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	This course aims at building skills of students in research design. It will focus more on design science IS Research Framework which considers: theoretical framework - situated practices, learning practices and work-around practices. Topics covered include, fundamentals of research; relationships between theory and data; operationalization and measurement; ontology and epistemology of research; types of research methods; case study methods; design science research paradigm; the key properties of four design science research paradigms: ontology, epistemology, methods, and ethics; IS Design Theory; Design Research Method: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication; Design Science Research Patterns; preparing a research proposal; reading and assessing literature; research ethics; report writing, publication and presentation.	
Learning Outcome	<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • demonstrate competent use of a series of research strategies and methods • identify research problems and review related scientific literature; • have understanding of the current state and trends in design research in information systems, • get awareness on design paradigms, frameworks, theories, methods, patterns, evaluation approaches, and rationales. • use these design techniques for reviewing papers, sketching research proposals, and writing articles and theses. • work effectively and comfortably within a community of researchers. • present and communicate their research project to their peer community • write research proposal and research report; 	
Course Content		
Unit	Topic	Week
1	Fundamentals of research <ul style="list-style-type: none"> • relationships between theory and data; • The Research Process. • Types of research methods; <ul style="list-style-type: none"> • case study methods; • Action Research, • Participatory action research, etc. 	1
2	Design science research paradigm <ul style="list-style-type: none"> • Placing Design Science Research in Context. • Difference between routine design practice and design science research. • The key properties of four design science research paradigms: <ul style="list-style-type: none"> ○ Ontology, epistemology, methods, and ethics; 	2-3
3	Design Science Research Frameworks <ul style="list-style-type: none"> • Understanding the Natural and Artificial Worlds • Systems Development in Information Systems Research • The general design cycle • Action research framework 	4

	<ul style="list-style-type: none"> • Design Research Methodology 	
4	<p>The Science of Design for Software-intensive System Design Science</p> <ul style="list-style-type: none"> • The Science of Design Challenges • Software-intensive systems • Science of design principles • Categories of software-intensive system 	5-6
5	<p>Systematic Literature Review and DSR</p> <ul style="list-style-type: none"> • Definition, Origins and Needs • Conceptual Framework • Search Strategy • Quality Assessment 	7-8
6	<p>People and Design</p> <ul style="list-style-type: none"> • Designing for Consumers • Practice of Ethnography in Design • Reflection in Action • The use of focus groups in design science research 	9-10
7	<p>Design and Creativity</p> <ul style="list-style-type: none"> • Creativity concepts • Group creativity • Experiential learning • Creativity, Design and IT 	11-12
8	<p>Design Science Looking to the Future</p> <ul style="list-style-type: none"> • Exploration of design and problem solving within business; • Design Science in the management disciplines • Design of Emerging Digital Services 	13-14
Recommended References:	<ol style="list-style-type: none"> 1. Aline Dresch • Daniel Pacheco Lacerda. Jose Antonio Valle Antunes Jr. (2015). Design Science Research: A Method for Science and Technology Advancement 2. Williamson, Kirsty and Johanson, Graeme (2013) <u>Research Methods: Information, Systems and Contexts</u> 3. King, Ronald S. (2012). Research Methods for Information Systems 4. <u>Aileen, Cater-Steel</u> and <u>Latif, Al-Hakim</u> (2008). eds. Information Systems Research Methods, Epistemology, and Applications (Premier Reference Source) 5. Kuechler, W. and Vaishnavi, V., (2008). The emergence of design research in information systems in north america. Journal of Design Research, 7(1):1–16. 6. Peffers, K., Tuunanen, T., Rothenberger, M., and Chatterjee, S., (2008). A design science research methodology for information systems research. Journal of Management Information Systems, 24(3):45–77. 	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.5 IT618 IT Service Management

Prerequisites:	IT615	
Credit Hours:	3 (7 ECTS)	
Description	The course provides students with practical and theoretical insights into the processes and practices of systematizing the planning, design, implementation, delivery, tracking, monitoring, measurement and optimization of services; effective alignment and management of IT systems and services to achieve operational excellence; approaches to service strategy, plan and design, implementation, operation and improvement; standards, reference frameworks and best practices for structuring and improving IS/IT service delivery and management; key challenges in the adoption and application of such frameworks and practices. The course also covers discussions on organizational maturity levels for services.	
Learning Outcome	<p>After completing the course, students will be able to:</p> <ul style="list-style-type: none"> • Grasp service concepts from the origin and trend of IT industry • Gain an appreciation of the management complexities associated with implementing IT services • Perceive new service development from both product and process perspectives • Understand operations of successful IT service firms as benchmarks for future management practices • Develop a service mindset along with an understanding of "state of the art" IT service management • Become aware of the service opportunities for enhancing competitiveness • Realize the organizational significance of managing the IT services to achieve internal and external customer satisfaction • Extend knowledge scope from Technique to Management and from IT Engineering to Service Science 	
Course Content		
Unit	Topic	Week
1	<p>Service management as a practice</p> <ul style="list-style-type: none"> • What are services? • Understanding the value of services • Evolving role of IT • Issues in IT service management • IT service management standards, • IT service management reference frameworks • IT service management best practices • Key challenges in the implementation of frameworks and practices 	1-2
2	<p>Service strategy processes</p> <ul style="list-style-type: none"> • Service portfolio management • Demand management • Financial management for IT Services • Business relationship management 	3-4
3	<p>Service design processes</p> <ul style="list-style-type: none"> • Service design overview • Design coordination • Service catalog management • Service level management 	5-6

	<ul style="list-style-type: none"> • Availability management • Capacity management • Information security management • Supplier management • IT service continuity management 	
4	<p>Service transition processes</p> <ul style="list-style-type: none"> • Transition planning and support • Change management • Service asset and configuration management • Release and deployment management • Knowledge management 	7-8
5	<p>Service operation and processes</p> <ul style="list-style-type: none"> • Event management • Incident management • Request fulfilment • Problem management • Access management 	9
6	<p>Service operation functions</p> <ul style="list-style-type: none"> • Service desk • Technical management • Application management • IT operations management • Organizational maturity levels for services 	10
7	<p>Building a service step-by-step</p> <ul style="list-style-type: none"> • Build blueprint • Build team organization • Strategy building stage • Design building stage • Transition building stage • Implementing building stage • Monitoring service build plan example 	11
Book review, Case illustration, Team case project		12-14
Recommended References:	<ol style="list-style-type: none"> 1. IT Service Management, 2016, by John Sansbury, Ernest Brewster, Aidan Lawes, Richard Griffiths 2. Implementing ITSM: From Silos to Services: Transforming the It Organization to an It Service Management Valued Partner, , 2014, by Randy a. Steinberg 3. Foundations of IT Service Management with ITIL 2011: ITIL Foundations Course in a Book, 2011, by Brady Orand and Julie Villarreal 4. Service Management: Operations, Strategy, Information Technology, 2010, by James A. Fitzsimmons 5. Service Modelling: Principles and Applications, 2006, by Vilho Räsänen 	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.6 IT644 Enterprise Cloud Computing

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	<p>Cloud Computing is a large-scale distributed computing paradigm which offers scalable computing resources on-demand as an option for IT systems acquisition, deployment and management. This course provides a graduate-level comprehensive introduction to advanced Cloud Computing topics and technologies and their practical implementation. Specific topics covered include: architectural service models of Cloud including, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS); concepts of Virtualization and Cloud Orchestration; Cloud platforms and software tools; Cloud programming paradigms and data analysis/mining tools; and Cloud security models and associated challenges. Mainstream Cloud infrastructure services and related vendor solutions are also covered in detail, with practical exercise on the creation and configuration of virtual machines for building scalable cloud applications. Case studies drawn from industrial applications will also be used to introduce Cloud capabilities and related standards and best practices.</p>	
Learning Outcome	<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • understand the underlying principles, architecture and concepts of cloud virtualization, cloud storage, data analysis and visualization, and security; • design and develop scalable cloud-based applications by creating and configuring virtual machines; • compare, contrast, and evaluate the key trade-offs between various cloud computing solutions and implementation approaches; • explain core issues and challenges in delivering of ICT services using cloud computing, including issues related to security, privacy and interoperability 	
Course Content		
Unit	Topic	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> • Cloud Computing • Enterprise Architecture • Cloud Computing and Enterprise Architecture 	1
2	<p>Cloud Computing Business Models</p> <ul style="list-style-type: none"> • Introduction • Business Models and the Cloud Layers • Cloud Computing Layers • Business Model of the Cloud • Infrastructure as a service • IaaS Variants • Platform as a Service • Software as a Service • The cloud and the Evolving Relationship 	2-4
3	<p>Identifying and Accessing Management in Cloud Computing</p> <ul style="list-style-type: none"> • Cloud computing Market • Related Work • Proposed Identity and Access Management 	5-6

	<ul style="list-style-type: none"> • Deployment Plan 	
4	<p>Cloud Computing: An Enabler in Developing Business Models for Global Enterprises</p> <ul style="list-style-type: none"> • Cloud computing from Enterprise’s Perspective • What is new in the Cloud? • Case Study 	7-8
5	<p>The Cloud Challenges for Enterprise Architects</p> <ul style="list-style-type: none"> • Next Generation Cloud Services • The impact of Cloud Computing on the Service Industry • Cloud Issues for Enterprise Architects • Approaches for Cloud Enablement 	9-10
6	<p>Service Level Agreements in Cloud Computing: Perspectives of Private Consumers and Small-to-Medium Enterprises</p> <ul style="list-style-type: none"> • Dissecting Cloud SLAs • Data Concerns in Cloud SLAs • Stimulating Cloud Adoption 	11-12
Book review, Case illustration Team case project		13-14
Recommended References:	<ol style="list-style-type: none"> 1. The Enterprise Cloud: Best Practices for Transforming Legacy IT, 2015, by James Bond 2. Enterprise Cloud Computing: Technology, Architecture, Applications, Nov 22, 2010, by Dr Gautam Shroff 3. Enterprise Cloud Computing: A Strategy Guide for Business and Technology Leaders, 2010, by Andy Mulholland and Jon Pyke 4. Cloud Enterprise Architecture, 2012, by Pethuru Raj 5. Cloud Computing: Concepts, Technology & Architecture (The Prentice Hall Service Technology Series from Thomas Erl), 2013, by Thomas Erl and Ricardo Puttini 6. Data Centre Infrastructure & Organization, 2016, by George Haynes <p>There will also be supplemental readings beyond the References such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Critiques of selected readings and research papers, 70%: Term papers.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.7 IT646 IT Security Management

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	This course will give students comprehensive knowledge and experience working with enterprise level IT systems focusing on database administration and security, network administration and security, and information security. Topics covered include: data security standards and guidelines. configuration management, core networking services, system monitoring and troubleshooting. The course also addresses practical aspects of information security in operating systems, databases, network applications; infrastructure capacity planning; business continuity and recovery requirements assessment and planning.	
Learning Outcome	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • install, configure and manage enterprise database systems and network resources, including hardware/software; • understand practical aspects of IT system security risks in an enterprise and ways that they can be mitigated • monitor enterprise systems for problems and use that information to locate and fix any issues within the system 	
Course Content		
Unit	Topic	Week
1	Introduction	
2	Organization assets <ul style="list-style-type: none"> • Intangible assets • Tangible assets • Intangible and Tangible assets • Possible security risks 	1-2
3	Network Schematic <ul style="list-style-type: none"> • IP address • Protecting network/ information • Protecting computers • Protection details of the company 	3-4
4	What is Risk <ul style="list-style-type: none"> • Security risk management process • Benefit of risk analysis • Identify the risk areas • Qualitative risk matrix • Qualitative risk matrix to the identified risks areas • Assess the identified risks • Developing Risk management plan 	5-6
5	Information security management system <ul style="list-style-type: none"> • What is ISO 17799/BS 7799-1 • What is ISO 27001/BS 7799-2 	7
6	What is physical security <ul style="list-style-type: none"> • Layered security • Physical security threats • Physical security issues 	8-9
7	Information security principles <ul style="list-style-type: none"> • Security Governance • Policy mapping 	10

	<ul style="list-style-type: none"> • How to fit policies standards and guidelines together • The policy design process • policies to the company 	
8	<p>Appropriate tools that can be used to control and monitor access to resource in the company</p> <ul style="list-style-type: none"> • Servers • Routers • Firewall 	11
9	<p>Human mistakes</p> <ul style="list-style-type: none"> • Solutions to the human mistakes 	12
Book review, Case illustration Team case project		13-14
Recommended References:	<ol style="list-style-type: none"> 1. The Practice of System and Network Administration, Second Edition, 2007, by Thomas A. Limoncelli and Christina J. Hogan 2. The Practice of System and Network Administration: Volume 1: DevOps and other Best Practices for Enterprise IT (3rd Edition), 2016, by Thomas A. Limoncelli and Christina J. Hogan 3. Database Administration: The Complete Guide to DBA Practices and Procedures (2nd Edition), 2012, by Craig S. Mullins 4. Database Design, Application Development, and Administration, Sixth Edition, 2014, by Michael Mannino <p>There will also be supplemental readings beyond the References, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.8 IT656 IT Project Management

Prerequisites:	IT615	
Credit Hours:	3 (7 ECTS)	
Description	This course is mainly designed to prepare IT project managers, novice or experienced, with project management skills needed to better manage IT projects. Built along the IT project management lifecycle, this course covers detailed topics of the basic concepts of IT project management, including initiating, planning, controlling, executing, and closing projects. The course also shows how IT projects should be managed, from inception to post implementation review. Topics covered include: project management concepts and processes; project initiation, planning, execution, control, and project close-up; project scope and quality management, project time and cost management, project resources management, conflict resolution and project risk management; the use and application of project management software tools.	
Learning Outcome	<p>Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • recognize the key issues in IT project management • understand the processes involved in cost budgeting and preparing a cost estimate and budget for an information technology project. • improve their management skills and abilities to define the project scope, create a workable project plan, and manage within the budget and schedule. • use Gantt chart and PERT methods for planning and tracking project schedules and create a critical path; and • Build up the baseline knowledge for further career in IT project management fields. 	
Course Content		
Unit	Topic	Week
1	Overview <ul style="list-style-type: none"> • Project management concepts and processes • IT Project characteristics and features • Dimensions of complexity 	1
2	Projects as Systems <ul style="list-style-type: none"> • Project management systems • Project entities • Project communications • Project environment 	2
3	Project Selection & Approval <ul style="list-style-type: none"> • Measurement of impact • Selection practice • Cost-benefit analysis 	3-4
4	System Development <ul style="list-style-type: none"> • Methodologies • Standards • Lifecycle • Tools 	5
5	Processes, Methods & Tools <ul style="list-style-type: none"> • Project planning process • Project pricing and estimation method • Project scheduling methods • Project management tools 	6-7

6	Processes, Methods & Tools <ul style="list-style-type: none"> • Managing project time and resources • Ensuring project quality • Assessing project risks and resolving conflicts • Controlling project costs • Measuring Project Success • Closing the Project 	8-9
7	Trends & Developments <ul style="list-style-type: none"> • Enterprise Project Management Frameworks • Agile and Adaptive Project Management Cultures • Outsourcing and Offshoring Projects • Leading IT Projects • Project Management Maturity Model 	10-11
Book review, Case illustration Team case project		12-14
Recommended References:	<ol style="list-style-type: none"> 1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 2017, by Harold Kerzner 2. Information Systems Project Management: A Process and Team Approach, Edition 1.1, 2017, by Joseph S. Valacich and Joey F. George 3. Information Systems Project Management, 2014, by David Olson 4. Information Systems Project Management, 2008, by David E. Avison and Gholamreza Torkezadeh <p>There will also be supplemental readings beyond the references, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination. <i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i>	

2.7.9 IT711 IT Systems Acquisition and Management

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	The topics covered in this course include : the nature of IT Systems in an enterprise context; IT investment Planning and Acquisition Methods: IT requirement analysis; IT application portfolio; Evaluating IS investments; Selection of Hardware and Software Components; IT Cost Estimation: practical set of principles, tools and techniques to follow when managing the acquisition and integration of all corporate ICT solutions; challenges related to system acquisition and integration, effective change management and managing essential technologies.	
Learning Outcome	After successful completion of this course, student will be able to: <ul style="list-style-type: none"> • better understand the IT requirements in business environments; • practice different system acquisition mechanisms via case studies and presentation; • demonstrate an understanding of the problems and challenges of acquiring, integrating and implementing IT systems; • recognize the challenges (technical, managerial and organizational) of managing the change that an organization faces when it implements a new IT application; • Recommend approaches to overcome these challenges. 	
Course Content		
Unit	Topic	Week
1	IS Planning and Acquisition Methods: <ul style="list-style-type: none"> • Information requirement analysis • IS application portfolio • Evaluating IS investments • Selection of Hardware and Software Components 	1-3
2	IT Systems Acquisition <ul style="list-style-type: none"> • Acquisition Strategy Development • System Cost Estimation • Work-breakdown structure • Procurement vs. Implementation • Acquisition models 	4-6
3	IT System Integration and Management <ul style="list-style-type: none"> • IT technologies and their applications to system integration • Business Acquisition Strategies • Management Strategies • Fit between Business and IS Strategies 	7-9
	Implementing and managing Systems <ul style="list-style-type: none"> • Interoperability issues • Resources management • Managing Change • Institutionalization • System Sustainability issues 	
4	Ethical Issues <ul style="list-style-type: none"> • Corporate Corruption • Bias in Procurement 	10
Case studies of system acquisition and management		11-14

Recommended References:	<ol style="list-style-type: none"> 1. Effective Methods for Software and Systems Integration, 2012, by Boyd L. Summers 2. Enterprise Integration: An Architecture for Enterprise Application and Systems Integration 2002, by Fred A. Cummins 3. Managing Software Acquisition: Open Systems and COTS Products, 2001, by B. Craig Meyers and Patricia Oberndorf <p>Journal Journal of Strategic Information Systems</p> <p>More references will be suggested by respective instructors.</p>
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>

2.7.10 IT715 IT Governance and Audit

Prerequisites:	IT618	
Credit Hours:	3 (7 ECTS)	
Description	The course provides students with a practical and theoretical insight into percepts, principles and dimensions of governance focused on business and IT alignment, compliance with internal and external policies/regulation, provision of added value, accountability and risk management; structures, processes, and relationship mechanisms related to the planning & organizing, acquiring & implementing, delivering & supporting, monitoring the entirety of IT systems and services within the organization; standards/practices and related implementation challenges. Necessity for a comprehensive IT governance and management; common frameworks and standards for IT operations: COBIT and COSO (why), ITIL (how), CMMI, FAIR and ISO 27001 (assessing operational and cyber security risks, and for managing information security); integrating complementary aspects of frameworks	
Learning Outcome	<p>Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> • Link IT processes, resources, and information to enterprise strategies and objectives. • Integrate and institutionalize optimal ways of planning and organizing Enterprise IT systems • monitoring and evaluating IT performance, • Effectively communicate emerging issues, potential risks, and audit results to key stakeholders. • Critically appraise the effectiveness of IS governance structure to ensure the return on IT investment. 	
Course Content		
Unit	Topic	Week
1	IT Governance Concepts <ul style="list-style-type: none"> • IT systems and services within organizations • IT governance and management • Enterprise and Governance • From IT Governance to Enterprise Governance of IT • Governance Codes • Governance percepts, principles and dimensions • Enterprise Governance • Governance, Risk and Compliance (GRC) challenges 	1-2
2	Key Frameworks and Standards <ul style="list-style-type: none"> • Structures and processes • Internal Controls and COSO • The COBIT Framework and its Drivers • IT Governance and ITIL • IT Governance Standards: ISO 9001, 27002, and 38500 • IT Governance and Val IT 	3-5
3	Implementation Challenges <ul style="list-style-type: none"> • Customization of Frameworks • Integrating complementary aspects of frameworks 	6-7

	<ul style="list-style-type: none"> • Maturity Assessment 	
4	<p>Building and Monitoring Effective IT Governance Systems</p> <ul style="list-style-type: none"> • SOA and IT Governance • IT Configuration Management Concepts • IT Portfolio Management • Enterprise Content Management (ECM) and governance • Impact of Social Media Computing • Executive leadership and support • Enterprise Audit Committee's IT role 	8-9
5	<p>IT Policy</p> <ul style="list-style-type: none"> • IT Compliance Policy • Data Governance Policy • Identity Management Policy • Change Management Policy • Disaster Recovery & Business Continuity Policy • IT Security Policy 	10
6	<p>Audit Program</p> <ul style="list-style-type: none"> • IT Strategic Management Audit • Identify Management Audit • IT Risk Audit • Cloud Computing Audit • Network Perimeter Audit 	11
Book review, Case illustration ,Team case project		12-14
Recommended References:	<ol style="list-style-type: none"> 1. IT Governance: How to Reduce Costs and Improve Data Quality through the Implementation of IT Governance, 2017, by Helmut Schindlwick 2. IT Compliance and Controls: Best Practices for Implementation, 2008, by James J. DeLuccia IV 3. Governance Of Enterprise It Based On Cobit 5: A Management Guide, 2014, by IT Governance Publishing 4. Executive's Guide to IT Governance: Improving Systems Processes with Service Management, COBIT, and ITIL, 2013 5. by Robert R. Moeller 6. IT Auditing Using Controls to Protect Information Assets, 2nd Edition, 2011, by Chris Davis and Mike Schiller 7. IT Security Risk Control Management: An Audit Preparation Plan, 2016. by Raymond Pompon <p>There will also be supplemental readings beyond the References, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	<p>Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination.</p> <p><i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i></p>	

2.7.11 IT754 Thesis / Project

Prerequisites:	All courses
Credit Hours:	6 (14 ECTS)
Description	The Thesis / project runs for a full semester and constitutes the final and concluding task in the Masters in Information Technology Management. After completing all courses required in the masters program of Information Technology Management, students shall have acquired substantial scientific expertise in a broad range of fields within IT, as well as developed the ability to communicate research/project results to the society. As partial fulfilment of the award of the masters degree, a student is expected to conduct independent, high-quality research (thesis) or carry out capstone industry project in the field of Information Technology. The student is required to identify a research topic or capstone project of interest to him/her.
Learning Outcome:	On completion of the project, students will be able to <ul style="list-style-type: none"> • demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field of IT; • demonstrate specialised methodological knowledge in the main field of study
Recommended References:	<ol style="list-style-type: none"> 1. Enjoy Writing Your Science Thesis Or Dissertation! : A Step-By-Step Guide to Planning and Writing A Thesis or Dissertation for Undergraduate and Graduate Science Students (2nd Edition), 2014, by Elizabeth M Fisher and Richard C Thompson. 2. Writing the Winning Thesis or Dissertation: A Step-by-Step Guide, 2018, by Randy L. Joyner and William A. Rouse 3. A Manual for Writers of Research Papers, Theses, and Dissertations, Ninth Edition: Chicago Style for Students and Researchers, 2018 by Kate L. Turabian and Wayne C. Booth 4. Writing for Social Scientists: How to Start and Finish Your Thesis, Book, or Article: Second Edition, 2007, by Howard S. Becker and Pamela Richards
Resource Requirements:	Sufficient experienced supervisors, Computer Labs, Internet connectivity
Supervision	The thesis supervisor assesses and approves thesis research proposal, guides candidate's research, approves the thesis for defence, and assesses the research work as member of thesis examination board
Role of Students	Candidates have the responsibility to identify research area (topic), follow guidance provided by their respective supervisors on their proposals and the research process that they are engaged in, conduct and report the research, and regularly interact with their respective supervisors
Assessment:	Research progress demonstration, presentation and written report. The results of a thesis, which is documented as a report, should be able to produce a material that can potentially be acceptable for publication in a journal or a conference proceeding. Assessment and grading will be made by a thesis examination board formed for each thesis based on area of study.

2.8. Description of Elective Courses

2.8.1 ES727 Special Topics in Information Technology Management

Prerequisites:	None
Credit Hours:	3 (7 ECTS)
Description	This course aims at developing the capability of students to critically and scientifically review published works and also introducing students to current research issues and results in selected areas of IT Service Management and IT Governance. Students are provided with a list of papers published on accredited journals or conference proceeding to choose from. Each student will choose papers, critically evaluate, prepare and submit a well-written report followed by oral presentation findings and critics.
Learning Outcome	After successful completion of this course, student will be able to: <ul style="list-style-type: none"> • get professional updates in the field of Information Technology Management • get state-of-the-art recommendations from expert faculty and guest lecturers on Information Technology Management • Recognize advanced topics in Information Technology Management • critically review papers and point out limitation and strong points, • get research ideas for projects and thesis.
Course Content	
Topics vary according to the interest of students and instructor. Typical topics include <ul style="list-style-type: none"> • ITIL • COBIT Framework • IT Audit • Big data analysis, etc. 	
Recommended References:	As suggested by respective instructors
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,
Assessment:	Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination. <i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i>

2.8.2 IT732 Cyber Security

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	This course deals with cyber security concepts and practices. Topics covered include: fundamental frameworks, models, and approaches to cyber security; basic engineering and analysis methods for managing cyber security risk to valued assets. cyber security threats, vulnerabilities and risks; strategies to mitigate potential cyber security problems; technical approach in protection of information assets and systems; external and internal security threats in highly connected enterprises and risks to the core business relative to people, processes, data, facilities, and technologies; Major technical components of security architectures (firewalls, virtual private networks, etc.) and selected methods of attacking enterprise architectures will be addressed.	
Learning Outcome	<p>After successful completion of this course, student will</p> <ul style="list-style-type: none"> • have internalized the fundamental notions of threat, vulnerability, attack and countermeasure. • have an appreciation for the concerns of privacy and some of the approaches to fend them off. • understand and model the economics of cyber security. • understand the purpose of security protocols and be witness to the difficulties of their verification. • understand the threats and vulnerabilities that are specific of a networked environment, and explain countermeasures including firewalls and intrusion detection systems. • have an understanding for the vulnerabilities brought about by modern web-based application and services, and discuss countermeasures. 	
Course Content		
Unit	Topic	Week
1	Overview <ul style="list-style-type: none"> • Introduction to cyberspace and cybersecurity • Cybersecurity threats, vulnerabilities and risks • External and internal security threats 	1-2
2	Strategies to mitigate potential cyber security problems	3
3	Standards and best practice documents	4
4	Security Governance <ul style="list-style-type: none"> • Principles • Outcomes • Components • Approaches • Security policy 	5
5	Managing Cybersecurity I <ul style="list-style-type: none"> • People management • Information management • Physical asset management • System development management • Business application management 	6-7
6	Managing Cybersecurity II <ul style="list-style-type: none"> • Access control • Network infrastructure management • Threat and incident management 	8-9

	<ul style="list-style-type: none"> • Business continuity management 	
7	Management and Incidents <ul style="list-style-type: none"> • Security planning • Business continuity planning • Handling incidents • Risk analysis • Dealing with disaster 	10
8	Emerging Topics <ul style="list-style-type: none"> • The Internet of Things • Economics • Computerized elections • Cyber warfare 	11
Book review, Case illustration, Team case project		12-14
Recommended References:	<ol style="list-style-type: none"> 1. Effective Cybersecurity: A Guide to Using Best Practices and Standards, 2018, by William Stallings 2. Cybersecurity: The Essential Body Of Knowledge, , 2011, by Dan Shoemaker and Wm. Arthur Conklin 3. Principles of Information Security (MindTap Course List) 2017, by Michael E. Whitman and Herbert J. Mattord 4. Principles of Information Security, 2014, by Michael E. Whitman and Herbert J. Mattord. 5. "Black Hat Python: Python Programming for Hackers and Pentesters", First Edition, 2014, by Justin Seitz. 	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination. <i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i>	

2.8.3 IT741 Data Centre Design and Management

Prerequisites:	None	
Credit Hours:	3 (7 ECTS)	
Description	The primary objective of this course is to deliver broad awareness of data center requirements, design and management technologies and methodologies. This includes: reliability, security, network systems (network design principles, design, and cabling) storage systems, industrial design, systems management, operating environments (environmental monitoring and control systems) Data center security systems. (standards and certifications); application environments/management, operations, logistics and energy efficiencies. Key considerations in design of a data center and global trends for data center development and technologies will also be covered.	
Learning Outcome	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> • Select data center services according to business needs and industry practice; • Understand different components configurations and their suitability for different needs and situations; • Comprehend the essential elements in a data centre network; • Calculate the Total Cost of Ownership of operating a data center; • Master the essence of different data center standards and requirements for relevant certifications; • Translate business needs to data center facility configurations that address business, financial, technology, regulatory, management, and operational needs; • Comprehend the landscape of data center technologies development and the possible evolution to data center design 	
Course Content		
Unit	Topic	Week
1	Modern IT Business Requirements and Challenges <ul style="list-style-type: none"> • Changing the Perception of IT • Assurance • Business Continuity • Disaster Recovery • The regulatory landscape • The data growth challenge • Resiliency & availability • The demand for Data Centers 	1-2
2	Data Center Evolution <ul style="list-style-type: none"> • History of modern data center • Data center tier classification 	3
3	Cloud Computing <ul style="list-style-type: none"> • Understanding Cloud Computing • Concept and models • Cloud Technologies • Web Services (SOAP and REST) • Virtualization Technology • Cloud Computing Architecture and Mechanisms • Working with Cloud • Cloud Security and Management 	4-6

4	Server Virtualization <ul style="list-style-type: none"> • Big Data/Analytics • Disaster Recovery 	7-8
5	Virtual desktop infrastructure <ul style="list-style-type: none"> • Software defined storage • Aligning the data center with business needs 	9
6	Data Center Establishment <ul style="list-style-type: none"> • Data center architecture • Data center design • Data center structure • Data center design case study 	10
7	The future of data centers <ul style="list-style-type: none"> • Cloud-enabled Smart Enterprise 	11
Book review, Case illustration ,Team case project		12-14
Recommended References:	<ol style="list-style-type: none"> 1. Data Center for Beginners: A beginner's guide towards understanding Data Center Design, 2017, by B.A. Ayomaya 2. Building a Modern Data Center: Principles and Strategies of Design, 2016, by Scott D. Lowe and David M. Davis 3. Data Center Virtualization Fundamentals: Understanding Techniques and Designs for Highly Efficient Data Centers with Cisco Nexus, UCS, MDS, and Beyond, 2013, by Gustavo A. A. Santana 4. The Art of the Data Center: A Look Inside the World's Most Innovative and Compelling Computing Environments, Prentice Hall, , 2012, by Alger, D. 5. Next Generation Data centers in Financial Services: Driving Extreme Efficiency and Effective Cost Savings, Elsevier Science. 2009, by Bishop, T., 	
Teaching Strategy:	Lectures, discussion forums, tutorials, reading assignments and term papers,	
Assessment:	Guideline: 30%: Continuous Assessment, 30%: Critiques of selected readings and research papers, 40%: Final Examination. <i>Should be noted that the instructor has the freedom to determine student assessment techniques based on the nature of the course and/or his/her approach.</i>	

2.9. Assignment of Course Codes

The course code has two alphabets and three-digit numbers like IT631. The two alphabets code indicates the name of the program with all capital letters, For instance, IT indicates abbreviation of the program of Information Technology Management.

The course codes are made in the following format:

- ITXXX, where:
 - “IT” represents the short form of the program name for courses in the Information technology management program
 - ‘XXX’ represents a 3-digit numeric part of the course code with the following convention:
 - The first digit indicates the level of the course in terms of the year (‘6’ for 1st year of the graduate program and ‘7’ for 2nd year of the graduate program);
 - The Second digit indicates level and similarity of the courses in the program
 - The third digit indicates the semester within which the course is offered (odd numbers are given for courses given in the first semester and even numbers are given for courses given in the second semester).

3. Resources

The Masters program in Information Technology Management is well organized in staff and teaching learning facilities. The resource availed will allow students to be well equipped with current trends and research methodologies that will give them ability to discover and learn advanced issues independently. The general resources required for the program are summarized in the table below:

Resource	Description
Human Resource	Four Full time Staff (Assistant Professor or Above)
Classroom	Two class rooms each with LCD projector and Internet connectivity
Computer Lab	One Computer Lab with at least 13 computers, capable of accommodating 26 students at a time
Library	A Graduate library equipped with At least two reference materials (soft or hard copy) for each of the courses proposed in the curriculum
Software	All required software is in place per the requirements of each course
Tools and Accessories	Network toolkit, consumables (cables, Rj-45 connectors, and other connectors), devices (switch, access point, router, hub etc.)

4. Course Offering Schedule

Year I Semester I			
Code	Course Title	Credit Hrs.	ECTS
IT615	IT and Business Strategy Alignment	3	7
IT625	Service Innovation and Design	3	7
IT631	Research Methods in IT and Systems	3	7
ES621	Systems Theory and Systems Thinking	3	7
	Total Credit	12	28
Year I Semester II			
Code	Course Title	Credit Hrs.	
IT618	IT Service Management	3	7
IT644	Enterprise Cloud Computing	3	7
IT646	IT Security Management	3	7
IT656	IT Project Management	3	7
	Total Credit	12	28
Year II Semester I			
Code	Course Title	Cr. Hrs.	
IT711	IT Systems Acquisition and Management	3	7
IT715	IT Governance and Audit	3	7
	Elective	3	7
	Total Credit	9	21
Year II Semester II			
Code	Course Title	Cr. Hrs.	
IT754	Thesis / Project	6	14
	Total Credit	6	14

5. Quality Assurance

The curriculum design focused on what still said to be lacking: **QUALITY**. This quality vision is achieved mainly through:

- attracting qualified and committed staff;
- maintaining curricula that meet national and international standards;
- maintaining standard class sizes that allows close follow-up and individualized service
- Standardization of course offerings through preparation of general course outlines, exam contents, and external audit;
- the actual provision of opportunities for students to take what has been learnt in classroom and transform it into uses in the real world;
- use of state-of-the-art laboratories, computing facilities, and educational support materials;
- Periodical workshops (with stakeholders, teachers and graduates);
- Summative review of the program every two years;
- Graduates' evaluation of the program;
- Assessments using survey project works/research, internships, and link programs;
- Annual assessment of the program;
- Establishing Alumni of Graduates as a mechanism to assess their career development.

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